United States
GPS Industry Council

January 12, 2012

FILED ELECTRONICALLY

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: *Ex Parte* Communication of the U.S. GPS Industry Council in File No. SAT-MOD-20101118-00239 and IB Docket No. 11-109

Dear Ms. Dortch:

In this letter, the U.S. GPS Industry Council ("USGIC") responds to an ex parte communication by LightSquared Subsidiary LLC ("LightSquared") in the above-referenced proceedings dated December 23, 2011 ("LightSquared Letter"). Lightsquared's filing of December 23rd offers *some* results from testing of *some* high precision Global Navigation Satellite System (GNSS) receivers performed at Alcatel Lucent; nonetheless, from this limited testing LightSquared draws the following broad conclusions:

> As demonstrated by the test results attached to this filing, LightSquared's planned terrestrial deployment is fully compatible with GPS operation, even for the highest precision equipment available on the commercial market. Leading manufacturers have quickly demonstrated that resiliency can be achieved using readily available components which have similar costs and form factors to those that have previously been used by the equipment.[1]

The Council notes, however, that neither of these conclusions can be drawn from information provided.

With respect to the first conclusion, that Lightsquared's planned deployment is compatible with equipment available on the commercial market, most of the tested antennas that showed some degree of immunity to Lightsquared emissions were experimental units. The hurdles to making any of these prototypes commercially available are significant. As noted by Hemisphere (one of the manufacturers whose equipment was tested):

> One problem that was not explored was the impact of antenna filtering changes to GLONASS signal group delays and impacts of group delay

[1] Lightsquared Letter at 8.

2000 K Street, NW • Suite 600 • Washington, DC 20006-1809
Tel. (202) 416-6282

> ripple in a networked RTK solution using different manufacturer's antennas.[2]

Additionally, Manufacturer 1 (whose true identity is not disclosed) notes the same problem and adds the following observation:

> Increased RF filtering directly affects the performance Multipath Digital Signal Processing. Multipath interference is one of the biggest error sources limiting the range measurement accuracy of High Precision GNSS receivers. This test did not test Multipath DSP performance.[3]

Manufacturer 1 also observes that:

> The A99664 antenna degraded the C/N_0 consistently by about 1 dB with respect to the A61911. This is likely due to the higher insertion loss associated with its more aggressive filter design. Loss of 1 dB would be undesirable in many applications where the GPS signals are likely to be weak or obstructed.[4]

In other words GPS signal loss would occur even where LightSquared transmissions are not present in order to avoid even greater signal loss from the presence of LightSquared transmissions.

Thus, LightSquared's generalized conclusion that these antennas are "commercially available" is completely at odds with Manufacturer 1's statements:

> Both of these receivers are prototype in nature and are not "Production Ready". It may take 6 months to a year to qualify these receivers for High Precision GNSS applications.[5]

LightSquared's second conclusion – that manufacturers have demonstrated resiliency that can be achieved with similar costs and form factors to previous equipment – is equally troubled. As Manufacturer 1 notes:

> The cavity filtering technology used in the A61911 is relatively large and expensive. It is suitable for fixed reference stations or in locations where size, weight, and cost are less important. However, this technology would be unsuitable for applications that are price sensitive, size constrained and where low weight is important.

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[2] LightSquared Letter, Attachment 2 at 22.

[3] LightSquared Letter, Attachment 3 at 17.

[4] LightSquared Letter, Attachment 3 at 16.

[5] LightSquared Letter, Attachment 3 at 17.

> Both of these antennas are only compatible with GNSS receivers that can accept an RF cable connection from an external antenna.
>
> Neither modified antenna tested would be suitable to replace current miniature antennas used in most airborne, handheld and some land applications.[6]

These statements by the manufacturers of the very equipment that was tested places in serious doubt LightSquared's assertion that the result of its testing was "achieved using readily available components which have similar costs and form factors to those that have previously been used by the equipment." Indeed, Manufacturer 1 notes that all of the prototype antennas tested could only be used with equipment that accepts external antennas, which omits a substantial amount of the precision GPS equipment in use.[7]

Many GPS receiver and antenna performance criteria must be met before any changes or substitutions can be considered suitable for the equipment they replace. As noted by the manufacturers referenced above, there are size, weight, cost, and form factor considerations that may be compromised in the redesign of GPS receivers. Electrically, there are noise figure and other performance issues such as the ability to work with multiple RNSS signals and MSS correction signals, and the ability to mitigate the effect of multipath distortions to the position measurement.

Besides those items raised by the manufacturers, other criteria are essential, and must be carefully controlled to generate production-worthy redesigns. These include electrical performance criteria such as antenna phase center variation and RF gain in the antenna stage. They also include issues such environmental performance and reliability. None of these considerations can be brushed aside easily. For example, design of a unit aimed at meeting the required electrical criteria will surely have larger filters of a different form factor, which might not pass the vibration requirements of machine mounted use.

Finally, a single antenna that successfully meets all of the requirements will not be compatible with all manufacturers' equipment, let alone compatible with all applications. Even more challenging is the substantial number of precision GPS sets whose antenna is integrated with the receiver, which is not addressed at all in the Lightsquared Letter.

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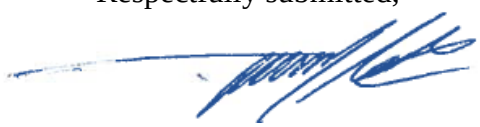
[6] LightSquared Letter, Attachment 3 at 17.

[7] LightSquared Letter, Attachment 3 at 17.

In summary, the conclusions of its own testing that Lightsquared offers are not supported by the data provided; in fact, the information Lightsquared provides refutes its own conclusions.

Please contact me if you have any questions regarding the foregoing.

Respectfully submitted,



F. Michael Swiek
Executive Director
U.S. GPS Industry Council
mswiek@mike-intl.com